April 5, 2006
GFK-2320H

IMPORTANT PRODUCT INFORMATION

READ THIS INFORMATION FIRST

Product: PACSystems™ RX7i CPU Module (700 MHz)

CPU Firmware Version 3.80
Ethernet Firmware Version 3.60

IC698CRE020-FF

Firmware version 3.80 provides many of the features that previously existed only on the non-redundant RX7i controllers to the CRE020 redundant controller. (The RX7i Ethernet firmware remains at release 3.60.) New features in this release, which are all previously released in other PACSystems CPU products, are:

- User Defined Function Blocks
- Support for IEC 61131-3 compliant Function Block Diagram programming language.
- Structured Text
- Support for IO Variables (Symbolic Variables) in hardware configuration.
- Support for managed and mapped variables (Symbolic Variables) in Redundant Transfer Lists including User Defined Function Block Instance variables.
- Support for Symbolic Variables in EGD configuration.
- Support for access to managed and mapped variables from C Blocks.
- Support for IEC 61131-3 compliant timer function blocks for pulse timer, on-delay timer, and off-delay timer.
- Support for the new RX7i power supply IC698PSD300
- Ability for user to interrupt Flash Read, Write, and Clear operations
- Support for the Horner Thermocouple Module (HE697THM160)
- Support for Series 90-70 Discrete Input Module IC697MDL650.

For details on these features, see page 8. Problems resolved in this release are described on page 3.

Updates

IC698CPE020-Ax, IC698CPE020-Bx, IC698CPE020-Cx, IC698CPE020-Dx, IC698CPE020-Ex or IC698CRE020-Ax, IC698CRE020-Bx, IC698CRE020-Cx, IC698CRE020-Dx, modules are field upgradeable to IC698CRE020-xF using the firmware upgrade utility.

You may order the field upgrade kit, 44A752281-G08, or download it at no charge from the web at http://globalcare.gefanuc.com/. The hardware cannot be upgraded.

Product Documentation

PACSystems RX7i CPU Reference Manual, GFK-2222
PACSystems RX7i Installation Manual, GFK-2223
PACSystems Hot Standby CPU Redundancy User's Guide, GFK-2308
PACSystems RX7i Memory Xchange Modules User's Manual, GFK-2300
TCP/IP Ethernet Communications for PACSystems User's Manual, GFK-2224
PACSystems TCP/IP Station Manager Manual, GFK-2225
PACSystems RX7i C Toolkit User's Guide, GFK-2259
Proficy™ Machine Edition Getting Started, GFK-1868
Proficy Machine Edition Logic Developer – PLC Programming Software Getting Started, GFK-1918
Important Product Information, PACSystems RX7i CPUs, GFK-2320H (this document)

CPU Functional Compatibility

For Ethernet functional compatibility, see page 3.

Subject	*Description*
Programmer Version Requirements	■ Proficy Machine Edition Logic Developer PLC 5.5 Service Pack 1 or later must be used for Release 3.80 new features, ■ Proficy Machine Edition Logic Developer PLC 5.0 Service Pack 3 or later must be used to program the CRE020 when using Modbus/TCP Server operation. ■ Proficy Machine Edition Logic Developer PLC 4.5 or later must be used to program the CRE020
C Toolkit Compatibility	The C Toolkit Release 3.50 Build 34A1 is required for new features in PACSystems Release 3.80. (Use of symbolic variables in C Blocks). The C Toolkit for PACSystems is distributed with Machine Edition Logic Developer PLC 4.0 or later. Toolkit build 21A2 or later is required for use with the RX7i. Toolkit build 47A1 or later is required for use with the Release 2.00 new features. Please note: The Series 90-70 Toolkit (IC641SWP709/719) is not compatible with PACSystems RX7i.
Series 90-70 Expansion Rack Compatibility	The PACSystems RX7i supports Series 90-70 expansion racks. PACSystems RX7i CPUs and the RX7i Ethernet Module do not operate in a Series 90-70 rack.
Series 90-70 Main Rack Compatibility	Series 90-70 Main Racks cannot be used in a PACSystems RX7i system. PACSystems RX7i CPUs and the RX7i Ethernet Module do not operate in a Series 90-70 Rack.
Single Width I/O Module Compatibility	The following additional single width I/O modules are supported by the PACSystems RX7i : Analog Input, 64 Channel, 16 bit resolution, Voltage (IC697VAL264) Analog Input, 12 bit, 32 Channel single-ended or 16 Channel differential (IC697VAL132) Analog Output, 32 Channel, 12 bit (IC697VAL301) Digital Input, 64 Point (IC697VDD100) Relay Output, 64 Point (IC697VDR151) Digital Output, 64 Point (IC697VDQ120) Eight Channel RTD/Strain Bridge (IC697VRD008) **Note:** These modules are fully integrated when installed in the Main Rack. When installed in an expansion rack the module must be configured as a generic VME module.

Ethernet Functional Compatibility

Subject	*Description*
SRTP and EGD Performance Differs from Series 90-70	SRTP and EGD performance in the RX7i differs slightly from the Series 90-70. Each RX7i Ethernet Interface supports a greater number of SRTP connections and EGD exchanges. Please also note that the RX7i currently has several SRTP and EGD operational restrictions when compared to the Series 90-70. When migrating Series 90-70 Ethernet applications to the RX7i, please carefully read the "Ethernet Operational Notes" section on page 19.
Series 90-70 LAN Interface Modules (IC697CMM741 and IC697CMM742) not supported by RX7i	Please note that the Series 90-70 LAN Interface Modules (IC697CMM741 and IC697CMM742) are not supported by the RX7i and should not be placed in an RX7i rack. The RX7i CPU contains an embedded Ethernet Interface. If additional Ethernet Interfaces are required, the RX7i Ethernet Module (IC698ETM001) should be used.
Programmer Version Requirements	Proficy™ Machine Edition Logic Developer PLC 5.0 Service Pack 3 or later must be used to program the PLC CPU for Modbus/TCP operation.
CIMPLICITY® Plant Edition Version Requirements	CIMPLICITY® Plant Edition 6.1 Service Pack 1a with Update 040204_s90tcp_6101 or Service Pack 2 or later must be used for Ethernet communications with PACSystems.

CPU Problems Resolved by this Release (3.80)

Subject	*Description*
Run mode store to redundant controller fails	In a redundant controller with 512 blocks, resynchronization (one redundant controller is running and the other redundant controller goes from stop mode to run mode) may corrupt user memory.
ENET intermittently loses CPU communication after Restart	When an Ethernet module is reset using the push button or a service request, occasionally the module will fail to power-up and re-establish communications with the PLC CPU.
CPU watchdog timer expires during run mode store when large number of blocks deleted	If a run mode store is performed that requires the PLC to delete a large number of stored logic blocks the PLC watchdog timer may expire.
Power Cycle During Online Edit	In previous releases, if the user stores a project to flash that is configured to power up from flash and then subsequently power is cycled in the middle of a Online Edit session, the programmer will still indicate that the Online Edit session is in progress after the power cycle. The user should cancel the Online Edit session to continue. This problem is corrected in release 3.80.
RAND_MAX and rand() Function Incompatible	In the C Toolkit, the RAND_MAX system variable is defined as a 32-bit integer. However, in previous releases, the rand() function returns a 16-bit integer. In release 3.50, rand() returns an integer between 0 and RAND_MAX.
COMMREQ Status Words Declared in Bit Memory Types Must Be Byte-Aligned	In previous releases, the CPU allowed configuration of COMMREQ Status Words in bit memory types on a non-byte-aligned boundary. Even though the given reference was not byte-aligned, the firmware would adjust it the next-lowest byte boundary before updating status bits, overwriting the bits between the alignment boundary and specified location. To ensure that the application operates as expected, release 3.80 requires configuration of COMMREQ Status Words in bit memory types to be byte-aligned.
Timed interrupt response time increased	A GBC in the system may impact response time for timed interrupts. The worst case interrupt response time for a PLC system with a GBC and no other Genius devices is 0.5 milliseconds. The worst case interrupt response time for a PLC system with a GBC and maximum amount of Genius data is 50 milliseconds.

Subject	*Description*
Possible ME disconnect when multiple GBCs are present in expansion/remote racks within a system.	If a system contains multiple GBCs in expansion/remote racks, it is possible for Machine Edition to timeout its connection to the PLC on a clear operation or a store of configuration. For each GBC located in an expansion/remote rack, a 3 second delay is added to the time required for a clear/store of configuration. This is true for both Ethernet and serial connections. In previous releases, the default connection timeout is 10 seconds and the default request timeout is 16 seconds. In release 3.80, these values have been increased by at least 3 seconds per each GBC physically located in an expansion/remote rack so that the default connection timeout is 13 seconds and the default request timeout is 19 seconds.
Repeated store of project containing C blocks	In previous releases, after many stores of a project that contains C blocks, the PLC CPU and/or Ethernet module may cease operation, requiring a power-cycle the main PLC rack to recover. This problem has been corrected in release 3.80.
Service Request 6: rounding of length parameter	In previous releases, processing for Service Request 6 C*hange/Read Number of Words to Checksum* incorrectly rounds the specified length to the next largest multiple of 8 bytes, rather than 8 words. Consequently, each sweep may checksum fewer words than expected. In release 3.80, the specified length for Service Request 6 is not rounded.
Serial Port Lock-up after Bad Modbus Message	In previous releases, if a badly formed Modbus RTU message is sent to the PLC, the serial port will lock up, requiring a power-cycle to recover proper port operation. In release 3.80, a defective Modbus RTU message does not cause the serial port to lock up
High Speed Counter Module Fails to Power Up Correctly	Rarely, after some extreme power loss events, a High Speed Counter with interrupts enabled may fail to power up successfully. After failure, the HSC may continue to function but will cease to communicate with the PLC. There are no module fault indicators for this event and the HSC ready bit will remain ON. The user should power cycle again to restore normal function. This problem has been corrected in release 3.80.
Pushing Ethernet Restart Button Multiple Times	In previous releases, pushing the Ethernet Restart button multiple times rapidly without letting the Ethernet module complete the restart may cause the PLC to go lights out. The user should power cycle the CPU to recover. This problem has been corrected in release 3.80.
Powering Up Unconfigured Expansion Racks During Run Mode	In previous releases, powering up an expansion rack that is currently not configured causes the sweep time to increase significantly (approximately 30-40 ms for each rack) for one sweep. If the PLC is in run mode, and multiple expansion racks are powered up at the same time, the software watchdog timer may go off. The user should ensure that all expansion racks are configured before being powered up, or power up the expansion racks while the PLC is in stop mode, or increase the software watchdog timeout appropriately, in order to avoid this problem. In release 3.80, powering up unconfigured expansion racks in run mode does not cause a software watchdog timeout.
SNP Update Datagram message	In previous releases, if an Update Datagram message requests 6 or less bits or bytes of data, the PLC will return a Completion Ack without Text Buffer. The protocol specifies that the returned data will be in the Completion Ack message, but it may not be. In release 3.80, the Completion Ack data includes the returned data.
EGD continues to Produce when the CPU is in STOP-HALT mode	EGD continues to produce exchanges when the CPU is in a STOP-HALT condition. EGD production should stop when the CPU is in STOP-HALT.
Bit Value parameter for Shift-Right and Shift-Left function blocks not initialized.	If the user does not provide an input value for the Bit value parameter (B1), the value used for the shift will be random (i.e. 0 or 1). There is no problem when a value is specified for the"B1" parameter.
Hardware Revision	The hardware revision, as displayed by the programmer, was not reported correctly (always reported a value of 4.0 which corresponds to Fab Revision D).

Subject	*Description*
Avoid Ethernet module resets	Resetting the Ethernet module, either by Service Request 24 or by the restart pushbutton, previously caused some of the PLC CPU's internal memory to be consumed if EGD was configured. The problem was more pronounced with larger EGD configurations.
Nuisance faults at power-up	If the programmer attempted SNP communications while the PLC was powering up, sometimes non-critical software event faults appeared in the PLC fault table. These no longer occur.
Avoid moving switch to STOP during power -up	If the RUN/STOP switch was in RUN when power was initially applied, and was moved to STOP before power-up was complete, the PLC sometimes went into RUN mode momentarily before entering STOP mode. This no longer occurs.
Power-up in over-temperature condition	If the PLC CPU is overtemperature when powered-up, it no longer logs a "PLC CPU hardware failure" fault, E.C. 4, Group 13, Fatal. Re-applying power to a PLC that has already detected that operating temperatures have been exceeded no longer results in PLC CPU LEDs blinking an error code and loss of memory contents.
Modbus RTU parity errors	In the case of an incoming message that contains a parity error, the message is now dropped.
Repeated downloads	Many repeated downloads of configuration via Ethernet communication no longer eventually result in Ethernet exception log event 28/9.
Nuisance Fault	The fault "Non-critical CPU software event -- serial port event" no longer appears occasionally at power-up.
Some summary fault bits not set	Previously, the summary fault %SC bits may not have been set for certain conditions (%SC10 and %SC12 for overtemperature or power supply fault; %SC9, %SC1, %SC13 for terminal block)
PLC CPU Communications stops	The PLC CPU no longer stops responding to any serial and Ethernet communications after many, many repeated attempts to read or write bit memory using an erroneous set of {segment selector, offset, length}.
Checksum SVC_REQ	Service Request 6 C*hange/Read Number of Words to Checksum* previously interpreted its parameter as a byte count. It now interprets the parameter as a word count. (However, see open problem CR-6622.)
Discrete Inputs scanned as 1 in Expansion rack with no power	In RX7i releases 2.56 and 2.57, turning power off of an Expansion rack would result in all discrete Inputs being scanned as a value of 1. This has been corrected such that discrete Inputs will be scanned as 0 (as specified) when an Expansion rack has lost its power.
Fuse, Aux, and Watchdog faults logged against Discrete IO modules on Expansion Rack powered down	If point faults are enabled in the configuration, the RX7i CPU will log up to two extraneous faults per module every time an expansion rack containing a discrete input and a discrete output module is powered DOWN.
Power Cycle During Large Run Mode Store, Word-for-Word Change or Online Edit Session Problem	Previously, if a power cycle occurs during a run mode store, word-for-word change or online edit change of a large program, the CPU might have powered up with memory corrupted. This problem has been resolved.
Modbus Station Address Configuration with Message Mode	When a port is configured for message mode during run mode, it will automatically switch to Modbus protocol during stop mode. There is now support for configuring a Modbus Station Address in this mode using the programmer. If not configured, the default address is 1.
GBC Will Not Default Its Outputs 250ms Later Than Expected	In previous releases of the RX7i CPU, an additional 250 ms was added to the timer that the Genius Bus Controllers use for detecting CPU failures. The resulting formula was: (2 x the CPU's configured watchdog timer) +250 ms with a maximum value of 3 seconds. The maximum setting for the GBC's timer was capped at 3 seconds. Therefore, in certain cases of RX7i CPU failure, the GBCs would default their outputs up to 250ms later when compared to the same scenario with a 90-70 CPU. Starting with this release, this is no longer true.

Subject	*Description*
Mode Transition with Scan Set > 1	When a scan set greater than one has been configured and stored, an attempt to go from Run Mode I/O Disabled to Stop Mode I/O Enabled will now be rejected. Previously, the PLC would transition to Stop Mode I/O Disabled.
%T Reference Table Cleared	Even if no logic is currently stored in the PLC, the %T reference memory is now cleared on a stop to run transition.
Fault Tables can be Cleared When Memory is Protected	If the switch on the PLC is configured for memory protection, and is in the "memory protect" position, you are now allowed to clear the fault tables.
Service Request 24 Only Generates Expected Faults	When Service Request 24 (Reset Smart Module) is executed, unexpected faults are no longer logged in the fault table. Please note that, because this service request resets a module, faults associated with resetting the module are expected
Attempting To Update ETM When Module In Slot Is Not ETM	If an attempt to upgrade ETM firmware is inadvertently directed to a slot containing an analog module, CMM, PCM, or GBC, WinLoader will no longer fail with the error "Target is unable to enter boot mode. Serial comm error: Request timed out." Now, WinLoader will produce a "Target device does not support firmware FLASH updates" error message. You should direct the upgrade to the correct slot.
Load or Store of Logic Containing Large Numbers of Blocks or Symbols Do Not Cause Disconnect	Previously, if the user attempted to load or store logic containing large numbers of blocks (>120) and/or large numbers of symbols to or from the PLC, the CPU would disconnect with the programmer and not reconnect until the connection timed out. In some cases, the user would need to power cycle with the battery disconnected in order to reconnect. This problem has been resolved.
CommReq Writing to %SC	A CommReq initiated to read and write to %SC memory using Bit Mode (Decimal 28) will now correctly access %SC memory (previously it was writing to %SB memory).
Canceling Download Does Not Cause Disconnect	Previously, if a download from the programmer was cancelled between the times that some files had been stored but no program files were yet stored, the PLC would disconnect and not reconnect. This problem has been resolved.
Service Request 7 Does Not Accept Invalid Day of Week Parameter	If an invalid day of the week is passed as a parameter to Service Request 7 in the unpacked BCD 2 or 4 digit year formats, the service request will now correctly not pass power.
Genius Redundancy with Faulted or Missing Module	Previously, if a GBC was configured for either Redundant Controller External or Dual Bus External mode, incorrect data would be scanned from redundant devices that were not connected, powered off, or failed. Both the scanned input data and associated point fault information (fault contacts) were incorrect. This problem has been resolved.
Ethernet Exceptions No Longer Logged When Passwords Enabled	When password protection is enabled for levels 2 - 4, the Ethernet interface no longer logs the following two exception events at powerup or restart. Event = 2, Entry 2 = 0030H and Event 8, Entry 2 = 000bH
Second programmer can change logic while in Test & Edit mode	While currently active in a Test and Edit session using Machine Edition on one PC, Machine Edition running on another PC is not prevented from storing new logic to the PLC.
Serial Port Diagnostic Failure on Power-Up	Activity on serial ports during power-up of the PLC no longer cause the PLC to log a fatal diagnostic fault. Now, a non-fatal diagnostic fault is logged. To avoid this fault, the serial cable can be disconnected during power-up, or the application sending the data to the serial port can be disabled.
Piggy Back Status Switch Position Bit Correct	The switch position bit in the piggy back status of SRTP traffic was inverted and based on the PLC sweeps state in previous releases. The bit now operates correctly.
Run Mode Store Following A Failed Run Mode Store Does Not Cause Stop/Halt	Previously, attempting a Run Mode Store after a failed Run Mode Store could cause the CPU to go to Stop/Halt.

Subject	*Description*
Configured Fault Actions Applied During Power Up When Loading From Flash	In previous releases, the fault actions in the hardware configuration loaded from flash were not applied until power up was complete. Default fault actions were always applied for any faults relating to hardware configuration that occurred during power up when loading from flash. With this release the fault actions specified in the configuration loaded from flash are applied during power up.
Power Cycle of Interrupt Block in Expansion Rack While in Run Mode Handled Correctly	Previously, if an interrupt module tied to an interrupt block was located in an expansion rack and the expansion rack was power cycled while in run mode, the interrupt block would no longer be triggered and an Unrecognized VME Interrupt Source fault would be logged. This problem has been resolved.
Invalid PTR Input to FIFO_RD Function Handled Correctly	Previously, if the value passed to PTR input of the FIFO_RD function was greater than constant which defined the table length, the PLC would go to Stop/Halt mode.
Communications Device Failure During Store	If the embedded Ethernet or ETM module resets in the middle of the store during a Stop Mode Store, Run Mode Store, or Test and Edit, or if the serial connection is lost in the middle of the store, the possibility of seeing a CPU software fault has been removed.
Configuration Changes for Generic VME Module Applied When Stored	In release 1.5 and 1.6 changes to the configuration of a previously configured VME 1-slot or 2-slot module are not applied when hardware configuration is stored.
Configuration mismatch with unsupported module causes PLC sequence store failure	If you attempt to store a hardware configuration to the CPU that has a module configured for a slot that physically contains an unsupported module, the store will fail with a sequence store failure.
Verify of Initial Values of FLASH after power-cycle may fail	In previous releases, a verify FLASH operation of initial values after a power-cycle may indicate that initial values are not equal. The “not equal” is a result of non-retentive variables being cleared during power-up, when compared with the non-zero values stored in FLASH. PLC operation has been changed to no longer clear non-retentive variables during power-up when a read from FLASH is performed as part of power-up, therefore non-retentive variables will have the values read from FLASH in this case.
Interrupt blocks execution in STOP/HALTED	In previous releases, interrupt block execution continued when the CPU entered STOP/HALTED mode. They now stop execution.
Modbus RTU Station Address Greater than 127	Modbus RTU station addresses with a value greater than 127 will now function correctly. Previously, values greater than 127 could be configured, but would cause communication to fail with a timeout.
HCT Request Failure	On previous releases, requests would fail when sent from applications using the following Host Comm Toolkit interfaces: HCT_estab_mem_list, HCT_cancel_mem_list and HCT_read_req with an address.addr_type of HCT_MEMLIST. This problem has been resolved.

Ethernet Problems Resolved by this Release (3.60)

Subject	*Description*
Pushing Ethernet Restart Button Multiple Times	Pushing the Ethernet Restart button multiple times rapidly without letting the Ethernet module complete the restart no longer causes the PLC to go lights out.
EGD Production Continues when CPU goes to HALT mode	EGD production no longer continues even when the CPU goes to HALT mode. This issue is resolved with CPU Firmware Release 3.11 or later and Ethernet release 3.60.
Producer ID of Zero in Capabilities Response	Producer ID no longer is set to zero in the EGD Capabilities response if the IP address is set up by the “setIP” utility.

New CPU Features and Enhancements in this Release (3.80)

Release 3.80 provides the following new features.

- User Defined Function Blocks
- Structured Text
- Support for IO Variables (Symbolic Variables) in hardware configuration.
- Support for IO Variables (Symbolic Variables) in Redundant Transfer Lists including User Defined Function Block Instance variables.
- Support for Symbolic Variables in EGD configuration.
- Support for access to managed and mapped variables from C Blocks.
- Support for IEC 61131-3 compliant Function Block Diagram programming language.
- Support for IEC 61131-3 compliant timer function blocks for pulse timer, on-delay timer, and off-delay timer.
- Support for variables (managed and mapped) in redundant transfer lists.
- Support for the new RX7i power supply IC698PSD300
- Ability for user to interrupt Flash Read, Write, and Clear operations
- Support for the Horner Thermocouple Module (HE697THM160)
- Support for Series 90-70 Discrete Input Module IC697MDL650.

Note that features, such as interrupt blocks, that were intentionally excluded from release 2.00 of the CRE020 will continue to not be supported on the CRE020.

New Ethernet Features and Enhancements (Release 3.60)

Release 3.60 of the RX7i Ethernet interfaces provides the following features and enhancements.

Modbus/TCP Client

Modbus/TCP Client capability has been added to PACSystems. The Modbus/TCP Client supports Modbus Conformance Class 0 function codes 3 and 16, Conformance Class 1 function codes 1, 2, 4, 5, 6, and 7, and Conformance Class 2 function codes 15, 22, 23, and 24. PACSystems Ethernet supports 32 Client connections shared between all Client protocols. For example, if 16 Client connections are used for SRTP Channels, 16 Client connections are available for Modbus/TCP Channels. Any given channel can be assigned to only one protocol at a time.

Ethernet Daughterboard BootLoader Firmware

The Ethernet Daughterboard BootLoader firmware was updated to support Ethernet Plug-in Applications.

CPU Restrictions and Open Issues

Subject	*Description*
Battery Installation	When installing a new battery, when there currently is no battery installed, the battery must be installed while the CPU has power. Failing to follow this procedure could result in the CPU not powering up. If a battery is installed while power is off (and there was no battery previously installed), and the CPU fails to power up, simply remove the battery, power cycle the CPU and then install the battery.
Ethernet Disconnect During Word for Word Change	If the Ethernet connection is broken during a word–for-word change, the programmer may not allow a subsequent word-for-word change after reconnecting due to the fact that it thinks another programmer is currently attached. If this occurs, you should go offline and then back online again.
Non-GE Fanuc VME Modules Operating as VME Masters	Non-GE Fanuc VME modules operating as VME bus masters have not been tested with the RX7i. Users interested in integrating this type of functionality should contact technical support.
Store of Hardware Configuration with Multiple GBCs	Storing a hardware configuration containing two or more GBCs twice may cause one GBC to fail configuration. Clearing the hardware configuration between stores will prevent this fault from being generated.
Simultaneous Clears, Loads and Stores Not Supported	Currently, the RX7i does not support multiple programmers changing CPU contents at the same time. The programming software may generate an error during the operation.
Fault Reporting With Analog Expanders	For fault reporting when an analog expander is used in a Series 90-70 Expansion Rack, a special case exists when the ALG230 base module is in slot 2 and an expander module is present in slot 9. In this case, if any expander module loses communication with the base module, then the fault reports for all 16 channels for that expander display the slot number as 0. The circuit number will be a value from 9 to 120, as shown in the following table. The I/O reference address for each channel is displayed as blank. SLOT EXPANDER CIRCUIT NUMBERS 3 1 9-24 4 2 25-40 5 3 41-56 6 4 57-72 7 5 73-88 8 6 89-104 9 7 105-120 For fault reporting when an analog expander is used in a PACSystems RX7i rack, a special case exists when the base is in slot 4 and an expander is present in slot 11. In this case, the slot number for a faulty expander is always displayed as slot 2, and the circuit number will display according to the slot used for the expander, as shown in the following table. The I/O reference address for each channel is displayed as blank. SLOT CIRCUIT NUMBERS 6 25-40 7 41-56 8 57-72 9 73-88 11 105-120
Power Cycle During Write to Flash	If the CPU is power cycled during the process of writing to flash, and is configured to power up from flash, a fault will be generated on power up.

Subject	*Description*
Hardware Configuration Not Equal After Changing Target Name	If the user stores a hardware configuration to flash which indicates that “Logic/Config Power up Source” is set to “Always Flash” or “Conditional Flash” and then subsequently changes the name of the target in the programming software, the hardware configuration will go Not Equal and will not Verify as equal.
PLC and IO Fault Tables May Need to be Cleared Twice to Clear Faulted State	Both PLC and IO fault tables need to be cleared to take the CPU out of Stop/Fault mode. If one of the tables contains a recurring fault, the order in which the tables are cleared may be significant. If the CPU is still in Stop/Fault mode after both tables are cleared, try clearing the fault tables again.
VME Modules Using Program Type AM Codes	When Block Transfers are enabled with a VME memory region that uses one of the program type AM Codes, the Rx7i CPU sometimes generates block transfer (BLT & MBLT) cycles to access the associated VME memory. Therefore, if you have a VME memory region configured to use one of the program type AM Codes (AM Codes 3Ah, 3Eh, 0Ah, or 0Eh), be sure to follow at least one of these two rules: a) The memory region's Interface Type parameter must not be set to "Qword Access (64-bit)", and the VME Block Transfer parameter must be set to "Disabled". -OR- b) The system may not contain any "program" and "data" VME memory regions with overlapping VME addresses. (If more than one VME module were to respond to a BLT or MBLT cycle, a system error could result.)
Setting Force On/Off by Storing Initial Value	Once a force on or force off has been stored to the PLC, the user cannot switch from force on to force off or vice-versa directly by downloading initial values. The user can turn off the force by doing a download, and then change the force on or off by another download.
CMM COMMREQ Restriction	Due to an issue in the CMM firmware, the SNP COMM_REQ Read System Memory (7202) executed on a CMM module does not execute correctly for lengths greater than 760 words. Incorrect data is written to the SNP Master. Users should not use lengths greater than 760 words.
Number of Active Programs Returned as Zero	The SNP request Return Controller Type and ID currently returns the number of active programs as zero.
Serial I/O Failure at 115K During Heavy Interrupt Load	Rare data corruption errors have been seen on serial communications when running at 115K under heavy interrupt load on the PLC. Under heavy load applications, users should restrict serial communications to 57K or lower.
Synchronized Backup Unit May Log Over Sweep Faults In Constant Sweep Mode	A synchronized backup unit may report over sweep faults in constant sweep mode regardless of the amount of time spent servicing IO, logic, and communications in the sweep.
Ret Control Info Doesn’t Return Controller ID	RET_CONTROL_INFO request currently always returns zeroes for the controller ID.
Null SNP ID From Service Request 11	Service Request 11 currently always returns zeros.
Bus Read or Write May Return Status of 5 Instead of 4.	In some cases, the Bus Read/Write Status Word returned may be 4 instead of 5 when the ending address is out of range.
Hardware Configuration and Initial Values May Not Load From Flash	The CPU may not load hardware configuration and/or initial values from flash when the configuration indicates to load from flash when the hardware configuration and/or initial values are stored to RAM without storing logic and then written to flash.

Subject	*Description*

PACSystems C Toolkit Definition for Unpacked BCD 4 Digit Year Structure Wrong	The definition of unpacked_bcd_tod_4_rec in release 1.0 and earlier of the PACSystems C Toolkit is incorrect. The definition should be:
	struct unpacked_bcd_tod_4_rec{
	T_WORD huns_year;
	T_WORD tens_year;
	T_WORD month;
	T_WORD day_of_month;
	T_WORD hours;
	T_WORD minutes;
	T_WORD seconds;
	T_WORD day_of_week;
	};

CPU Sweep Time Increases During Overtemp Operation	When the operating temperature of the CPU exceeds the normal operating temperature, system variable #OVR_TMP (%SA8) turns ON (Fault group 24, error code 0x0001). When this occurs the sweep time periodically increases because the CPU executes a new task to read the actual temperature reported by a temperature sensor. This increase can be as much as 2 ms.
GBC in Expansion Rack May Fail to Power Up	Occasionally, a EM731 module located in an expansion rack may fail to power up when power to that rack is cycled off/on. The module's OK light will flash and then all module lights will go off. Power cycle the rack again to recover.
Possible ME inability to connect	Infrequently, an attempt to connect a programmer to a PLC via Ethernet will be unsuccessful. The normal connection retry dialog will not be displayed. Rebooting the computer that is running the programmer will resolve the behavior.
Don't use multiple targets	In a system in which the hardware configuration is stored from one target and logic is stored from a different target, powering-up from flash will not work. The observed behavior is that, following a power up from flash, ME reports hardware configuration and logic "not equal".
Nuisance Faults (GBC in configuration)	Four "Non-critical CPU software event" faults may appear when some hardware configurations that contain GBC modules are stored. These faults may be ignored.
Sequence Store Failure	In systems with very large hardware configuration, it is possible to encounter a "PLC Sequence Store Failure" error when writing the configuration to flash. To avoid this error, either: 1. Perform an explicit clear of flash prior to performing the write. 2. Increase the operation timeout used by ME prior to performing the write.
Thermocouple Module Fails to Power Up Correctly	After some power loss events, the Horner Thermocouple module (HE697THM160) may fail to power up successfully. After failure, the AI data will not be updated correctly and will continue to return zero values. There are no module fault indicators for this event. The user should power cycle again to restore normal function.
C Toolkit PlcMemCopy Documentation Incorrect	This routine does allow the destination and source pointers to be outside of reference memory. If the destination points to discrete reference memory, overrides and transitions will be honored. Note that the header for PlcMemCopy has been updated in Release 3.50 of the C toolkit.
Fault Contacts on Modules in Expansion Rack	When an expansion rack powers up, the slot fault contacts will prematurely indicate that the modules in the expansion rack are not faulted *before* they complete their power up. Use I/O point fault contacts to verify validity of the I/O.
Fault Contacts on Remote I/O Station	If multiple faults exist in a Series 90-70 Remote I/O Station and one of them is corrected, a FAULT contact that uses the Remote I/O Station's module reference will incorrectly indicate that no faults exist at the Remote I/O Station.

Subject	Description
BIT_SEQ Function Block DIR Parameter	The BIT_SEQ Function Block should require the user to flow BOOLEAN logic into the DIR parameter, but currently does not. If no DIR parameter is present, the BIT_SEQ will increment by default.
Improper use of BIT_SEQUENCER could result in CPU going to Stop-Halt	Before using the BIT_SEQUENCER function block, the current step number (in the control block) must be set to a valid between 1 and the length (in the control block). Failure to properly initialize the count step number in the BIT SEQUENCER function block may result with the CPU going to STOP-HALT mode
CPU may not detect low-battery condition	PACSystems CPUs may not detect a low-battery condition early enough to provide a meaningful warning to the user to replace the battery. A battery with very low capacity may still have a terminal voltage high enough to report that it is a good battery. In this case, when the battery starts supplying the memory power (battery backup), the battery voltage would quickly drop to unacceptable levels, with little warning to the user before failure. To insure against data loss, users should replace batteries in accordance with the guidelines provided in the CPU Reference Manual, GFK-2222. Additionally, users could save logic and hardware configuration to flash.
Battery Status Shows Good with No Battery Attached	In rare conditions on some RX3i and RX7i CPU hardware, the battery status (Fault and %S14) may show good even when no battery is attached.

Ethernet Restrictions and Open Issues

Subject	Description
Ethernet module stays in Backup mode when CPU goes to Primary mode	When a system is goes from RUN mode to STOP mode and a new hardware configuration is stored to the system, the Ethernet module and CPU module are in different redundant states. To recover, hot swap (the Ethernet module) or power-cycle the system.
Number of SRTP Requests Tallied May Vary	When running multiple SRTP client channels, the number of requests, as reported by the client and the server, may differ between the connections.
SRTP Connections Remain Open After IP Address Changed	The Ethernet Interface does not terminate all open SRTP connections before changing its IP address. Once the local IP address has changed, any existing open TCP connections are unable to normally terminate. This can leave SRTP connections open until their underlying TCP connections time out. If quicker recovery of the SRTP connection is needed, modify the “wkal_idle” Advanced User Parameter to reduce the TCP keep alive timer down to the desired maximum time for holding open the broken connection. Refer to *TCP/IP Ethernet Communications for PACSystems,* GFK-2224, for details.
Reporting of Duplicate IP Address	The RX7i does not log an exception or a fault in the PLC Fault Table when it detects a duplicate IP address on the network.
REPP Does Not Save Results of Aborted PING	The station manager REPP command does not retain the results of a PING that is aborted due to error. The PING results are reported when the PING is aborted, but subsequent REPP commands give the results of the last successfully terminated PING.
Multiple Log Events	The Ethernet Interface sometimes generates multiple exception log events and PLC Fault Table entries when a single error condition occurs. Under repetitive error conditions, the exception log and/or PLC Fault Table can be completely filled with repetitive error messages.
Intermittent SNTP Loss of Synchronization	Under moderately heavy EGD traffic load, the Ethernet Interface may occasionally lose synchronization with its SNTP time server and generate exception log event 29, entry 2=bH.

Subject	*Description*
Reduced EGD Consumption with Large Numbers of Produced Exchanges	When large numbers of EGD exchanges are produced at a rapid rate, some consumed EGD exchanges may exhibit lower rates of consumption than expected. To better balance produced and consumed EGD exchange performance, reduce the number or frequency of the produced exchanges configured at this Ethernet Interface.
SRTP Communication Delays	Average latency of communications on SRTP channels may vary considerably due to TCP retransmissions. SRTP client applications should be designed to take this variance into account. In particular, SRTP client applications migrating from Series 90-70 SRTP Servers to RX7i may need to lengthen SRTP timeout parameters.
PLC Fault Table Last Update Date and Time	The PLC Fault Table web page does not display the correct data for the PLC date and time field. The date and time displayed are the PCs local date and time, not the PLCs date and time.
Spurious "Ethernet Failure" Error	On rare occasions, the error "Module hardware fault" may be reported on the Ethernet daughterboard. The corresponding fault in the exception log is Event = 1, followed by text "Ethernet failure". This fault is a nuisance fault and may be ignored.
Web Server Failure Under Heavy Load	After several hours of heavy load on the web server, the web server may fail to return pages and may cause a LAN system-software fault to be logged. The web server will resume serving pages when the load is reduced. (This applies only to the embedded Ethernet Interface.)
Reference Table Web Page Restriction	After the user selects a user defined table, if the user then tries to go back to the pre-defined table of %R1-%R60, an error message may be displayed stating "An error was detected when trying to retrieve setting from PC cookie".
Fault Table Web Page Restriction	On both the I/O and PLC Fault Table web pages, the PLC program name is not currently displayed in the area provided.
Cannot Set FTP Password	The CHPARM TPASSWORD Station Manager command fails. Processing an AUP File containing parameter "tpassword" generates an error.
Reference Table Web Page Format	When using Netscape 4.7 to view the reference table web page, the size of the columns is incorrect. The first column is much wider than the others.
Spurious Ethernet Fault	In rare instances, after power cycle, the Ethernet Interface may log the following fault, Event = 28H, Entry 2 = 000eH. This fault can be safely ignored.
Release 2.00 PLC Faults Are Not Identified on Web Page	When any PLC Fault Table entries defined for Release 2.00 or later are displayed using the Ethernet interface web server, the PLC Fault description contains only a generic message instead of the proper fault text.
Cannot send EGD Commands to Self	EGD Commands return COMMREQ Status 8F90H (= invalid IP address) when addressed to initiating Ethernet Interface's own IP address. If you wish to send an EGD command to yourself, please use the loopback IP address (127.0.0.1).
Unexpected EGD COMMREQ Status	EGD Commands may return COMMREQ Status 9590H (= internal error) instead of the expected B190H (= Can't locate remote node) when unable to locate a remote device on the network.
Too many EGD Commands Reported as Internal Error	The Ethernet Interface supports 10 simultaneous EGD commands. When an 11th EGD Command COMMREQ is issued, the CSW value 9590H (= internal error) is returned.
EGD Command Passwords are not Supported.	Optional passwords are not allowed within EGD Command COMMREQs.
Very Heavy EGD Production/Consumption at Server May Cause EGD Command Timeouts	Very heavy EGD production and/or consumption at a server device may cause EGD command timeout errors when another device attempts to send EGD commands to that server. If EGD commands must preempt normal production, you may set the "gcmd_pri" Advanced User Parameter to 2 (see GFK-2224, Appendix A). Note that by doing so, EGD exchange production may be delayed.

Subject	*Description*
SRTP Server Errors Can Cause Timeouts at Channels Client	The SRTP Server in the PACSystems Ethernet Interface can encounter various errors when the remote Series 90 PLC client takes down an SRTP connection and then establishes a new connection. This can cause unexpected channel timeout errors 0190H or 0290H at the client. The SRTP server errors in the Ethernet exception log are identified as Event = 2; Entry 2 may be 001cH, or 0021H.
EGD Command Range Failure Can Write Partial To PLC Bit Memory	When an EGD Command attempts a write operation to a bit-mode PLC reference memory range (%I, %Q; %T, %M, %SA, %SB, %SC) where the amount of data be written exceeds the configured size of that reference memory, the command will return failure status but partial data may be written into the reference memory. The amount of partial data written depends upon the starting bit memory location and the data length as follows: ■ If data starts on a byte boundary (location = (8*n) + 1), no partial data is written. ■ If data does not start on a byte boundary (location = (8*n)+1) and data exceeds the configured reference memory by 8 or more bits, partial data is written from the starting location to the next byte boundary after the starting location. ■ If data does not start on a byte boundary (location = (8*n)+1) and data exceeds the configured reference memory by less than 8 bits, partial data is written from the stating location to the end of configured reference memory. For a Write PLC Memory command, this can occur when writing data into the target PLC. For Read PLC Memory or Read Exchange commands, this can occur when writing data received from the target PLC into the local PLC memory. The logic application must not use any data returned to the local PLC if the EGD command status indicates failure. To avoid writing partial data to the local or remote PLC, be sure that bit memory data transfers do not exceed the configured reference memory sizes at the appropriate PLC.
Usage of New IP/Subnet Mask Configuration	Because the Ethernet interface operates using a retained set of IP address + subnet mask information, a change to these values does not take effect until a restart of the module or power cycle of the rack containing the module. The user should be aware when altering these configuration values that their effect is not immediate.
Cannot Change EGD Class 2 UDP Port Number	Processing an Advanced User Parameter File containing parameter “gctl_port” does not actually change the value.
COMMREQ Length Error	The COMMREQ Status Word value 8190H (="COMMREQ is too short") may also be reported for EGD Command COMMREQs that are too long (contain more words than expected).
No CPU fault logged when Ethernet Interface in fatal blink code	The CPU does not log any PLC or I/O Faults when the Ethernet Interface has a fatal blink code. The user’s application should monitor the LAN interface OK status bit to detect loss of module.
EGD I/O has unexpected variability under heavy load	EGD I/O has intermittent unexpected variability under heavy load. For a Produced Exchange, EGD samples may occasionally be delayed by as much as a production period.
Configuration of Direct IP and Redundant IP on different subnets not detected.	If the user configures the Direct IP and Redundant IP addresses on different subnets, this will not be detected either by Proficy Machine Edition Logic Developer or the Ethernet Interface. The Ethernet Interface will fail to activate the Redundant IP address, but will report successful activation.
Clear of large hardware configurations may cause log event 08/20	A Log event 08/20 may occur when very large hardware configurations are cleared and transfers are active on other Server connections. This log event can be safely ignored.

Subject	*Description*
COMMREQ Status Word of 0x54A0 occasionally returned for EGD commands	Occasional COMMREQ Status Word values of 0x54A0 are returned to COMMREQs for EGD commands when the previously transferred command has experienced retries in the network. Executing the COMMREQ again results in successful transfer of the command.

CPU Operational Notes

Subject	*Description*
Transfer List Validation not compatible with Release 2.0x CRE020	Redundant transfer lists generated using CPU Firmware release 2.05 or earlier are not compatible with the release 3.80 transfer lists. Redundant controllers that are running release 2.05 will not be able to synchronize with controllers that are running release 3.80 firmware.
Only One BTM Allowed in Main Rack	Only one BTM is allowed in the main rack. Multiple BTMs in the main rack will result in undefined operation.
Logic Executed in Row Major Instead of Column Major	Logic execution in PACSystems RX7i is performed in row major order (similar to the Series 90-30) instead of column major (similar to the Series 90-70). This means that some complicated rungs may execute slightly differently on PACSystems RX7i and Series 90-70. For specific examples, see the programming software on-line help.
Upgrading Firmware with Modules in Rack	The process of upgrading the CPU firmware with the WinLoader utility may fail when multiple IO modules are in the main, remote or expansion racks, due to the time it takes to power cycle the rack system. If the upgrade process fails, move the CPU to a rack without IO modules and restart the upgrade process.
NaN Handled Differently Than in 90-70	The PACSystems RX7i CPU may return slightly different values for Not A Number as compared to Series 90-70 CPUs. In these exception cases (e.g., 0.0/0.0), power flow out of the function block is identical to Series 90-70 operation and the computed value is still Not A Number.
PID Algorithm Improved	The PID algorithm used in PACSystems RX7i has been improved and therefore PID will function slightly differently on PACSystems RX7i than on the Series 90-70. The differences are: ■ The elapsed time is computed in 100 µS instead of 10 mS units. This smoothes the output characteristic, eliminating periodic adjustments that occurred when the remainder accumulated to 10mS. ■ Also, previous non-linear behavior when the integral gain is changed from some value to 1 repeat/second was eliminated.
Service Request 13 Command Block Must Contain Zero	When the Service Request function block is used to invoke Service Request #13, the first word of the command block sets the number of last scans to be executed. If the value of that word is -1 (or 0xFFFF), then the number of last scans is set to the value in the configuration.
Changing IP Address of Ethernet Interface While Connected	Storing a hardware configuration with a new IP address to the RX7i while connected via Ethernet will succeed, then immediately disconnect because the RX7i is now using a different IP address than the Programmer. You must enter a new IP address in the Target Properties in the CME Inspector window before reconnecting.

Subject	*Description*
Stack Allocation for Folders Converted from Series 90-70 Must be Increased	Series 90-70 folders are converted to PACSystems RX7i with the same stack allocation. PACSystems RX7i uses more stack space than the Series 90-70, so some folders may not run after conversion. To increase the stack space, right click the _MAIN block and select Properties. Stack Size is listed at the bottom of the Properties page. The default stack size in new PACSystems RX7i folders is 64KB. Folders with a large number of nested calls may need more stack space. As a general rule, the stack for the converted PACSystems RX7i folder should be set to approximately three times the stack size of the Series 90-70 version of the folder. A diagnostic fault will be displayed if the folder runs out of stack space.
Duplicate Station Address for Modbus Will Conflict with Other Nodes	The default serial protocol for the RX7i is Modbus RTU. The default Station Address is 1. If the PLC is added to a multi-drop network, care must be taken that the PLC is configured with a unique Station Address. Nodes with duplicate Station Addresses on the same network will not work correctly.
FST_EXE No Longer Represented by %S121	The PACSystems RX7i implementation of #FST_EXE is different from the Series 90-70 implementation. #FST_EXE is no longer stored in %S (%S121) memory. Instead, it is stored in a local memory that is not accessible to the user. You can reference #FST_EXE only by using its name (similar to referencing a symbolic variable). The #FST_EXE system variable can be accessed (read) in the logic of any block. Just as in the Series 90-70, PSB blocks and C blocks inherit the #FST_EXE value of their calling block. Again, as in the Series 90-70, #FST_EXE cannot be written.
Format for Fault Locating References Changed	Compared to the Series 90-70 CPU, syntax for the fault locating references has changed as follows: #RACK_00r is now #RACK_000r. #SLOT_rss is now #SLOT_0rss. #BUS_rssb is now #BUS_0rssb. #M_rssbmm is now #M_rssbmmm (adds support for 256 modules). Existence of old style (Series 90-70) fault locating references will cause errors to be generated during logic validation. The error generated will have the following format: Error 9618: Invalid reference type for operand [LD Block,'_MAIN': Rung 7]
Slot Restrictions for Analog Expander Module in RX7i Rack	The following restrictions apply to Analog Expansion Modules in a PACSystems RX7i rack: The base module must be in a slot no lower than Slot 4. The expander module must be in a slot no higher than Slot 11. No expander module may be in a slot lower than the base module. Because of these restrictions, and because the 90-70 modules occupy two slots in the PACSystems RX7i rack, a maximum of three expanders are possible. (Base in Slot 4, Expanders in Slots 6, 8, and 10 or Base in Slot 5, Expanders in Slots 7, 9, and 11.) Please note that these restrictions do not apply to Analog Expansion Modules in Series 90-70 Expansion Racks.

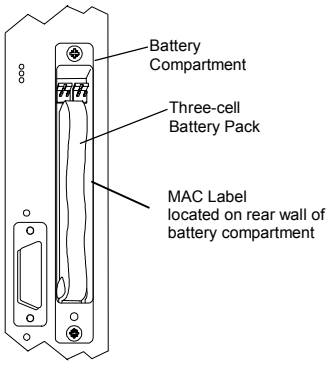
Subject	*Description*
Genius Bus Controller Restrictions	The following restrictions apply to GBCs in PACSystems RX7i: ■ The minimum CPU sweep time will be gated by the time it takes the GBC to refresh its outputs and collect its inputs + 500 microseconds. To obtain a smaller sweep time, use the SUSIO function block or place the GBCs in a scan set that has non-default characteristics. ■ If a %W reference address is used for COMMREQ status or return data, it must be in the range %W00001 - %W65536. ■ Storing or clearing a hardware configuration containing two GBCs attached to the same Genius network may cause a Loss of Device fault for one of the GBCs. This is caused by the GBCs clearing their SBAs asynchronously. The user can safely ignore the Loss of Device fault.
PCM (to CPU) Communications Timeout	The PCM has a default backplane communications timeout value of 5 seconds. After the PCM has sent a request to the CPU, the PCM applies this timeout while waiting on a response back from the CPU. In most cases, the CPU will respond well within the 5–second timeout; however, in certain instances the CPU can take longer than 5 seconds to respond. These cases are limited to LOADs or STOREs of program and/or configuration -especially if blocks in the program are larger than 8 KBytes. Folders containing EXE blocks (again with *.EXE files >8 KBytes) are most likely to cause problems. To ensure that the PCMs do not observe backplane timeouts, a file must be loaded (using termf) to the PCM. The file must be a binary file named CPU.ENV. The contents of this file are as below (all values are specified in hexadecimal): Once the binary file CPU.ENV (below) is created, use termf to load CPU.ENV to the PCM. Then execute a soft reset of the PCM. After executing the soft reset, the PCM's backplane communications timeout should be 10 seconds. **Note:** A copy of the CPU.ENV file can be obtained from http://www.geindustrial.com/cwc/gefanuc/support/ControllersIO/s9070-d.htm. **CAUTION** **The CPU.ENV file will not be used when a hard reset is performed on the PCM. With the CPU.ENV file resident in the PCM, a soft reset must be performed after every hard reset of the PCM. Be aware that it is possible to issue a soft reset COMMREQ from the Ladder Diagram application; therefore, the application can be modified to handle the required reset of PCMs after a power cycle of the PLC system.**

File Offset	Data															
0000	4C	5A	01	01	00	00	00	00-00	00	00	00	01	00	00	00	LZ. . . . .
0010	00	00	00	00	00	00	00	00-00	00	43	50	55	4C	49	4E	. . . . . C P U L I N
0020	4B	2E	43	4F	44	00	2D	62-00	36	34	00	2D	74	00	32	K . C O D . –b . 6 4 .–t . 2
0030	30	30	00	00	43	50	55	4C-49	4E	4B	2E	44	43	42	00	00 . .C P U L I NK . D C B .
0040	00	4E	55	4C	4C	3A	00	4E-55	4C	4C	3A	00	4E	55	4C	. N U L L: . N U L L : . N U L
0050	4C	3A	00	00	00	00	00	00-00	00	00	00	00	00	00	00	L : . . . . .
0060	00	00	00	00	00	00	00	00-00	00	00	00	00	00	00	00	. . . . .
0070	00	00	00	00	00	00	00	00-00	00	00	00	00	00	00	00	. . . . .

Subject	*Description*
Backplane Comm window Setting and Genius Redundancy	When using Genius Redundancy, do not set the backplane communications window timer to 0. Also be sure to allow enough time for the backplane communications window to run when using Constant Sweep mode. Ample backplane communications window time must be available for the GBCs to exchange information about Genius devices that are lost and added.
Expansion Rack ID	Series 90-70 expansion racks are shipped with the rack ID strapped for rack 0 (the main rack). If the rack jumper is not changed, the PLC CPU will not recognize the rack and may not properly identify the error.
Expansion Rack Cable	Connection and disconnection of an expansion rack cable while the CPU is running should not be attempted. This will cause the PLC to go to the STOP/HALT state.
Expansion Rack Power	Expansion racks should be powered up at the same time the main rack is powered up or they should be powered up after the main rack has completed its power up initialization. Do not power up an expansion rack while the PLC CPU is running power-up diagnostics.
Timer Operation	Care should be taken when timers (ONDTR, TMR, and OFDTR) are used in program blocks that are NOT called every sweep. The timers accumulate time across calls to the sub-block unless they are reset. This means that they function like timers operating in a program with a much slower sweep than the timers in the main program block. For program blocks that are inactive for large periods of time, the timers should be programmed in such a manner as to account for this catch up feature. Related to this are timers that are skipped because of the use of the JUMP instruction. Timers that are skipped will NOT catch up and will therefore not accumulate time in the same manner as if they were executed every sweep.
Constant Sweep	Constant Sweep time, when used, should be set at least 10 milliseconds greater than the normal sweep time to avoid any over-sweep conditions when monitoring or performing on-line changes with the programmer. Window completion faults will occur if the constant sweep setting is not high enough.
Large Number of COMMREQs Sent to Module in One Sweep Causes Faults	A large number of COMMREQs (typically greater than 8) sent to a given board in the same sweep may cause Module Software faults to be logged in the PLC fault table. The fault group is MOD_OTHR_SOFTWR (16t, 10h) and the error code is COMMREQ_MB_FULL_START (2). When this occurs, the “FT” output of the function block will also be set. To prevent this situation, COMMREQs issued to a given board should be spread across multiple sweeps so that only a limited number (typically 8 or less) of COMMREQs are sent to a given board in each sweep. In addition, the FT output parameter should be checked for errors. If the FT output is set (meaning an error has been detected), the COMMREQ could be re-issued by the application logic.
C Block Standard Math Functions do not Set errno	In C Blocks, standard math functions (e.g. sqrt, pow, asin, acos) do not set errno to the correct value and do not return the correct value if an invalid input is provided.
Loss of VDD100 or VAL132 After Multiple Power Cycles	In rare instances, a VDD100 or VAL132 module may not configure after power has cycled repeatedly in a very brief period of time. A Loss of IO Module fault will be generated. In extremely rare instances, this may also cause other modules to fail to configure, without generating additional loss of module faults. These additional failures may cause communication with the Ethernet Interface to fail. The user can recover from either of these cases by turning off power for at least 5 seconds and then restoring power. This will provide sufficient "off-time" to ensure that all modules can powerup properly.

Subject	*Description*
Modules not Reset During Firmware Upgrades	The RX7i currently does not reset any other modules in the system after a firmware upgrade. This may result in Loss of module faults being generated for smart modules.
Unable to Communicate Through Some Third Party Serial Cards	PACS Systems serial ports do not work with some third party serial cards.
Incorrect COMMREQ Status for Invalid Program Name	The program name for PACSystems is always LDPROG1. When another program name is used in a COMMREQ accessing %L memory, the error that is generated is 05D5, which is an invalid block name.

Ethernet Operational Notes

<table>
<tr><th>Subject</th><th colspan="2">Description</th></tr>
<tr><td>MAC address</td><td>A label on the rear wall inside the CPU's battery compartment identifies the MAC address assigned to the CPU's embedded Ethernet Interface. The label is visible when the battery is removed from its compartment. (The battery does not need to be disconnected to temporarily remove it from the compartment.)</td><td> 
</td></tr>
<tr><td>Configuration of IP Address is Required Before Using Ethernet Communications</td><td colspan="2">The Ethernet Interface within the CPU module cannot operate on a network until a valid IP address is configured. The necessary Ethernet addressing information must be configured prior to actual network operation, or to recover from inadvertent changes to the Ethernet addressing data at the Ethernet Interface. Use one of the following methods to initially assign an IP address:
■ Connect a serial terminal to the Station Manager port of the PACSystems RX7i . Then use the CHSOSW command to enter the desired IP address. For details, see the PACSystems TCP/IP Communications Station Manager manual, GFK-2225.
■ Temporarily assign an IP address to the module using the SetIP tool over the Ethernet network. For details, see TCP/IP Ethernet Communications for PACSystems, GFK-2224.
■ The Ethernet Interface automatically obtains a temporary IP Address from a BOOTP server on the network. For details, see TCP/IP Ethernet Communications for PACSystems, GFK-2224.
Once a temporary IP address has been set up, the Ethernet Interface can be accessed over the network (such as by the Machine Edition programming software). The programmer should then be used to configure the proper IP address for the Ethernet Interface.</td></tr>
</table>

Subject	*Description*
Proper IP Addressing is Always Essential	The PACSystems RX7i CPU's embedded Ethernet Interface must be configured with the correct IP Address for proper operation in a TCP/IP Ethernet network. Use of incorrect IP addresses can disrupt network operation for the PACSystems RX7i and other nodes on the network. Refer to TCP/IP Ethernet Communications for the PACSystems RX7i, GFK-2224 for important information on IP addressing. When storing a new HW configuration to the RX7i, be sure that the HW configuration contains the proper Ethernet addressing data (IP Address, Subnet Mask, and Gateway IP Address) for the RX7i. **Note:** Machine Edition programming software maintains the target IP address (used to connect the programmer to the target) independent of the contents of the HW Configuration for that target. The target IP address is set in the Target Properties in the CME Inspector window. Storing a HW Configuration whose Ethernet addressing data contains an IP Address that is different from the RX7i target IP address will change the IP address used by the target RX7i as soon as the Store operation is completed; this will break the Programmer connection. Before attempting to reconnect the Programmer, you must change the target IP address in the Target Properties in the CME Inspector window to use the new IP address. To regain communication at the former IP address, use the manual corrective action described above. Storing a HW Configuration containing default (0.0.0.0) or incorrect Ethernet addressing data to the PACSystems RX7i will result in loss of the Programmer connection and will require manual corrective action as described above.
Default IP Address (0.0.0.0) Attempts to Set IP Address via BOOTP	The default IP address value (0.0.0.0), whether obtained from HW Configuration or backup configuration, causes the Ethernet Interface to request a temporary IP address from a BOOTP server device on the network.
LAN Must be Tree, Not Ring	The two Ethernet network ports on the PACSystems RX7i Ethernet Interface must not be connected, directly or indirectly, to the same network device. The hub or switch connections in an Ethernet network must form a tree and not a ring; otherwise duplication of packets and network overload may result. In this situation, the RX7i Ethernet modules will continually reset.
Reporting of Duplicate IP Address	The PACSystems RX7i does not log an exception or a fault in the PLC Fault Table when it detects a duplicate IP address on the network.
Multiple Zero Period EGD Exchanges May Not Produce Similar Numbers of Samples	If more than one EGD produced exchange is configured for a production period of zero, the exchanges may not produce similar numbers of samples. Due to the way that scheduling occurs when multiple exchanges are scheduled "as fast as possible," some zero period exchanges may produce significantly more samples than others. For more consistent EGD production, configure the produced EGD exchanges with non-zero production periods.
Changing IP Address While SRTP Connection Open May Generate Log Events	Open SRTP Server connections established with a remote SRTP client are not terminated as expected when the RX7i's IP address is changed (typically by storing a new HW Configuration to the RX7i). A Series 90 SRTP client ("SRTP channels") reports either a 9690H or 0190H status; the SRTP connection may remain open until the connection is terminated as a result of a client timeout.
Series 90-70 Datagrams are Not Supported	Series 90-70 datagrams are not supported. This means that Series 90-70 - format variable list requests from Host Comm Toolkit applications will fail. (Series 90-30 – format datagrams are supported, but cannot access %P or %L memory in the RX7i.)
AUP Parameter Should Not be Changed	The Advanced User Parameter "wsnd_buf" should not be changed by the user. Changing the value of this parameter may cause the LAN LED to go out and the Ethernet Interface to drop connection.
Heavy Load can Block Station Manager	As explained in *TCP/IP Communications for PACSystems Station Manager Manual,* GFK-2225, Chapter 1, a heavy EGD and/or SRTP load can block Station Manager operation.

Subject	*Description*
One-time delay of EGD Production (and possibly Consumption) if more than 24 SRTP Server Connections are started simultaneously	If more than 24 SRTP Server connections are established simultaneously, EGD Production may be briefly delayed for each connection after the 24th when the connections are first made after power is applied. If EGD consume acceleration has been disabled, then EGD Consumption will also be delayed. The delay only occurs once when the SRTP Server connection is established for the first time after Powerup. No delay is experienced for the first 24 SRTP Server connections.
Web Server Browser Restrictions	Internet Explorer version 4.0 running on Windows 98 will give an error when the reference table web page is accessed. Web Server operation has been verified with Internet Explorer version 5.0
Very Heavy EGD Production/Consumption at Server May Cause EGD Command Timeouts	Very heavy EGD production and/or consumption at a server device may cause EGD command timeout errors when another device attempts to send EGD commands to that server. If EGD commands must preempt normal production, you may set the "gcmd_pri" Advanced User Parameter to 2 (see GFK-2224, Appendix A). Note that by doing so, EGD exchange production may be delayed.
AUP Parameter Name Change	Beginning with Release 2.00, the following Advanced User Parameters have been renamed to match the Ethernet hardware port identification: "`lduplex1`" is changed to "`lduplex1a`" (Ethernet Port 1A duplex state) "`lduplex2`" is changed to "`lduplex1b`" (Ethernet Port 1B duplex state) "`lspeed1`" is changed to "`lspeed1a`" (Ethernet Port 1A network speed) "`lspeed2`" is changed to "`lspeed1b`" (Ethernet Port 1B network speed) The old parameter names are no longer supported; use of an obsolete parameter name will result in a configuration processing error and an Ethernet exception (Entry = 2, Entry 2 = 06). Existing AUP files using the obsolete parameter names will have to be changed to use the new parameter names.
SRTP Application Timeouts Must Accommodate Network Connection Overhead	The application timeouts within SRTP Channels also include the time needed to establish and maintain the underlying network and SRTP connection. Examples are establishing the TCP connection for a new channel, establishing communication with the remote device, and TCP retransmissions during Channel operations. If the time needed for TCP connection establishment or maintenance exceeds the user-specified channel application timeout values, an application timeout will occur. Channel application timeouts are temporary errors; the channel continues to run.

Subject	*Description*
Client Channels TCP Resource Management	The OS Network stack hangs on to the TCP resources associated with a connection for a period of time after the connection is closed. It applies to the initiator of the close, which is almost always the client side. This time is referred to as the "TCP Linger Period". Once the TCP Linger Period expires (60 seconds in the current OS implementation), the TCP resources are released. Application developers using client channels need to be aware of this behavior when designing their logic. A finite number of TCP resources are allocated to client channels, and if channel connections are brought up and down so fast that these resources are depleted, then the application may have to wait until a TCP resource frees up in order to establish another client channel (a COMMREQ Status of 0xA890 is returned if no TCP resources are currently available; application should wait and try again). SRTP Client Channels provides features that help the user preserve TCP connections. These include a period time where one can establish an SRTP Channel and specify the channel to run at a given interval, or run as fast a possible. One can also specify a number of iterations, or allow the channel to run forever. Additionally, SRTP Channels allows channel re-tasking of an active channel to the same remote device, where the parameters of an active channel, such as changing the channel command type (Read/Write), number of repetitions, time periods, local memory address, remote memory address, etc. can be changed. SRTP Channels also allows channel re-tasking of an active channel to a different remote device (changing the remote device's IP address, etc.). However, re-tasking to a different remote device will neither conserve TCP connections, nor save on the time it takes to create a channel.
Client Channels and Redundant IP	In a Redundancy System, Client Channel COMMREQs can only be initiated from the unit that owns the Redundant IP address. Therefore, the user application logic should use Bit 6 in the LAN Interface Status bit area, "Redundant IP Active" as part of their enabling logic that drives a client channel COMMREQ.
Idle Modbus/TCP connection between a Series 90 and a PACSystems may be prematurely terminated	An idle Modbus/TCP connection between a Series 90 and a PACSystems may be prematurely terminated. There is an incompatibility between the TCP "Keep-Alive" timer values on the PACSystems Ethernet Interfaces and Series 90 Ethernet Interfaces. The issue is that the default value of the keep-alive timer for the Series 90 modules is set to a much higher value than for the PACSystems. To keep TCP connections open between a Series 90 Ethernet Interface and a PACSystems Ethernet Interface, the Series 90 Interface Advanced User Parameter wkal_time should be set to the value 750 to match that of the PACSystems. With this change, TCP connections remain open indefinitely. Note that this same issue occurs for SRTP Client Channels that have infrequent traffic and can be resolved by using the same technique.
Attempt to open 17 or more Modbus server connections may appear successful	If more than the maximum 16 supported Modbus Server Connections are attempted, the TCP connection may succeed, but no data may be subsequently transferred.

Installation in Hazardous Locations

The following information is for products bearing the UL marking for Hazardous Locations:

- Warning - explosion hazard - substitution of components may impair suitability for class i, division 2;
- Warning - explosion hazard - when in hazardous locations, turn off power before replacing or wiring modules; and
- Warning - explosion hazard - do not disconnect equipment unless power has been switched off or the area is known to be nonhazardous.
- Equipment labeled with reference to class i, groups a, b, c, & d, div. 2 hazardous locations is suitable for use in class i, division 2, groups a, b, c, d or non-hazardous locations only.